

## Delivering 1 GHz Multiprocessor Platforms With HyperTransport

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# Introduction of Broadcom

- ❑ Leader in the development of high-performance, integrated processor solutions for networking and communications equipment
  - ◆ World's highest performance MIPS™ core, the SB-1 (up to 1 GHz)
  - ◆ World's "best-in-class" power levels
  - ◆ World-class integration of multiple SB-1 CPUs, memory and I/O
  - ◆ Standard development tools & operating systems for programming flexibility
- ❑ Full licensee of the MIPS architecture

# Current Situation

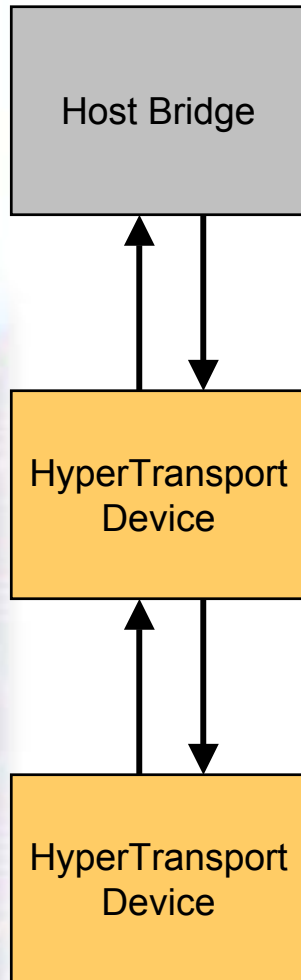
## □ PCI Weaknesses

- ◆ Low bandwidth
- ◆ Too many pins

## □ PCI Strengths

- ◆ Well understood
- ◆ Commonly used

# The Solution: HyperTransport I/O Bus

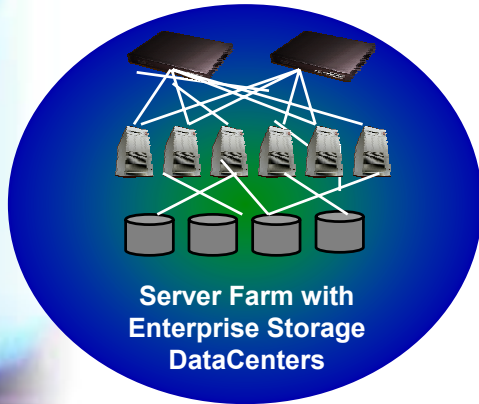


- ❑ New High Speed, Packet Based, I/O Bus
  - ◆ Defined by HyperTransport Consortium of which Broadcom is a Promoter.
  - ◆ Logically looks like PCI and uses PCI configuration mechanism
- ❑ Point-to-Point, Controlled Electricals
  - ◆ LVDS signaling
  - ◆ Source clocked at 600 MHz, data sent on both clock edges
  - ◆ 2, 4, 8, 16 or 32 bits wide in each direction for specification
  - ◆ BCM1250 and BCM1125/H use 8-bit links giving 9.6 Gbit/s in each direction, or 18.2 Gbit/s total
- ❑ Devices in Design Now
  - ◆ PCI/PCI-X bridges, HyperTransport switch, South bridges, MACs, graphics
- ❑ Interfaces to ASICs and FPGAs

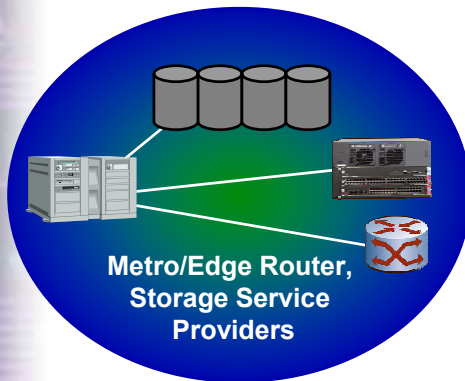
# How is HyperTransport Used

- Chip-to-chip interconnects
  - ◆ CPU to I/O connections such as PCI, PCI-X, InfiniBand, etc.
  - ◆ CPU to CPU
  - ◆ Switched applications with multiple CPU and I/O connections

# HyperTransport Supports Us in These Markets



- ❑ Servers, Server Appliances, Network Storage
- ❑ Switches, Routers, Gateways, Wireless Infrastructure
- ❑ Hardware Acceleration of Virtual Private Networks (VPN), Firewalls



# Why Broadcom Chose HyperTransport

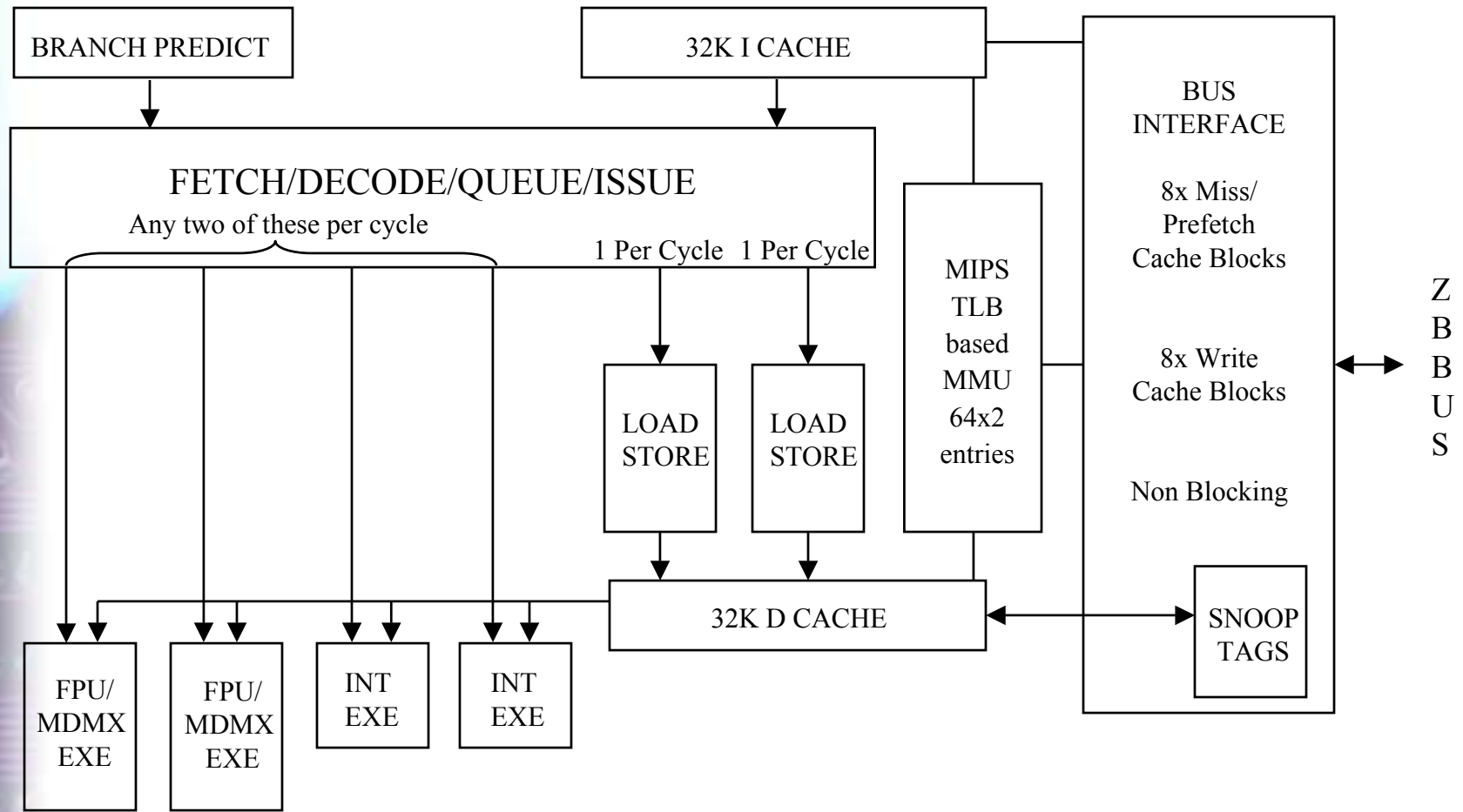
- ❑ High I/O bandwidth reduces bottlenecks
- ❑ Software is compatible with PCI
- ❑ System designs are similar to PCI
- ❑ HyperTransport allows multiple BCM1250 processors to be connected for scalability
- ❑ HyperTransport-PCI bridges are available to customers

# BCM1250

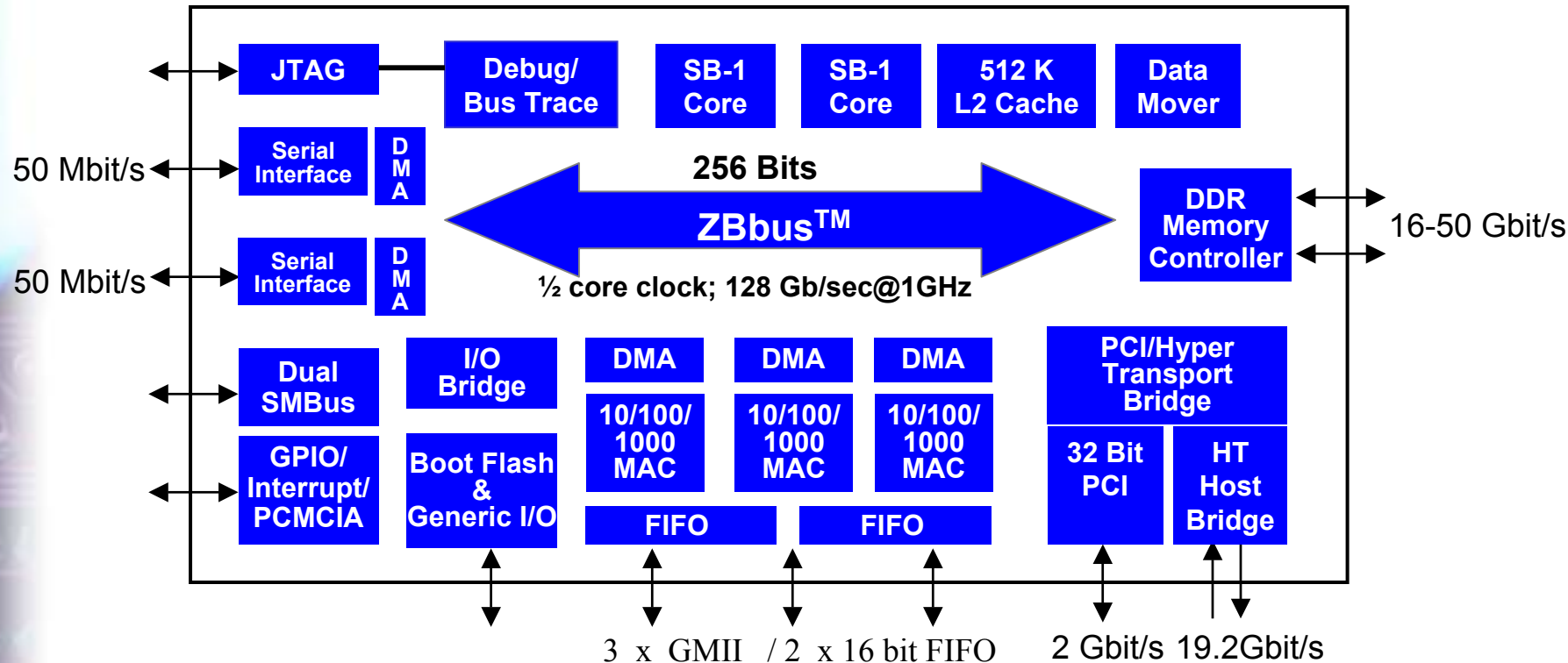
- ❑ Dual Processor, MIPS SOC @ 600MHz-1GHz
- ❑ Fast On Chip, Fully Coherent, MP Bus
- ❑ 512 KB L2 Cache, ECC Protected
- ❑ Integrated DDR Memory Controllers
- ❑ Integrated IO
  - ◆ 3 GMII, 32bit/66MHz PCI, HyperTransport, SMBus, GPIO, Flash interface, Interrupts, Timers, DMA, PCMCIA



# SB-1 Core Block Diagram

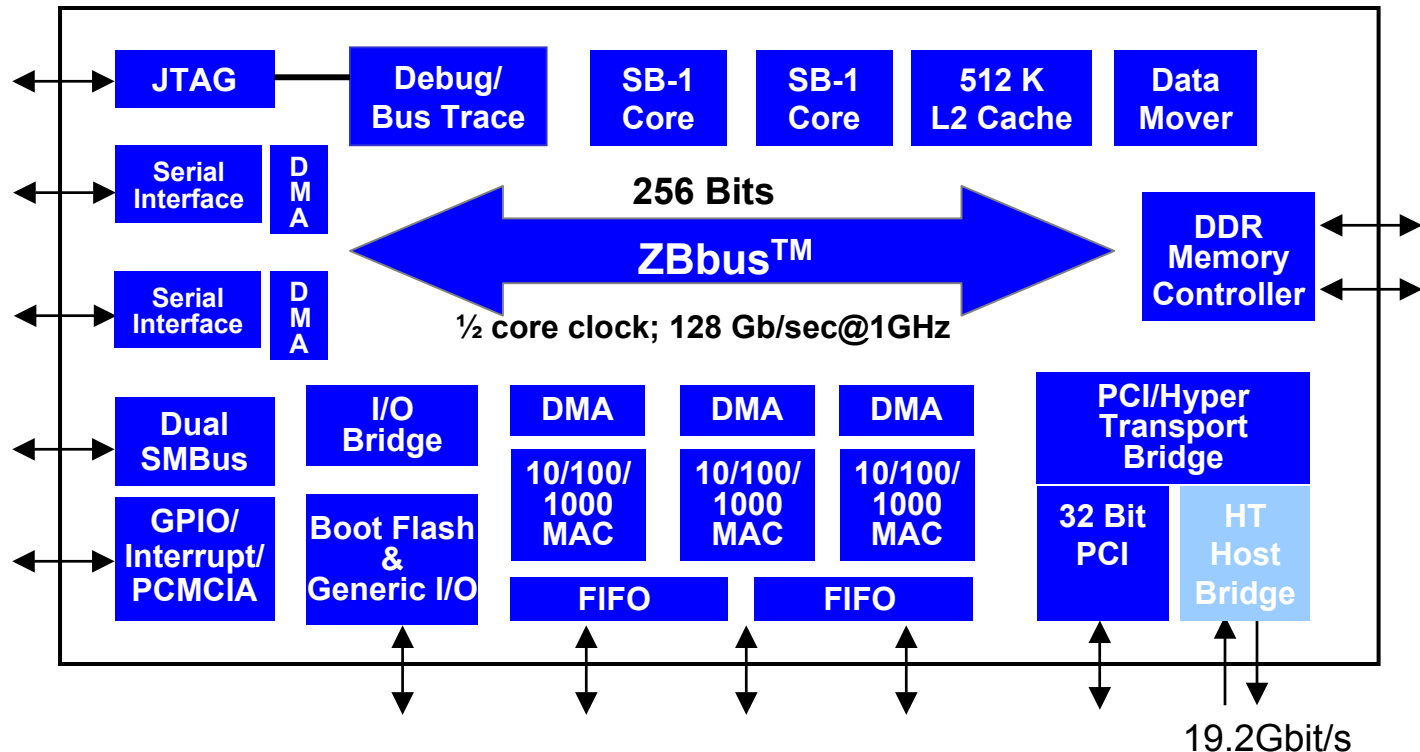


# Broadcom BCM1250 Block Diagram



# Broadcom BCM1250

## HyperTransport Bus



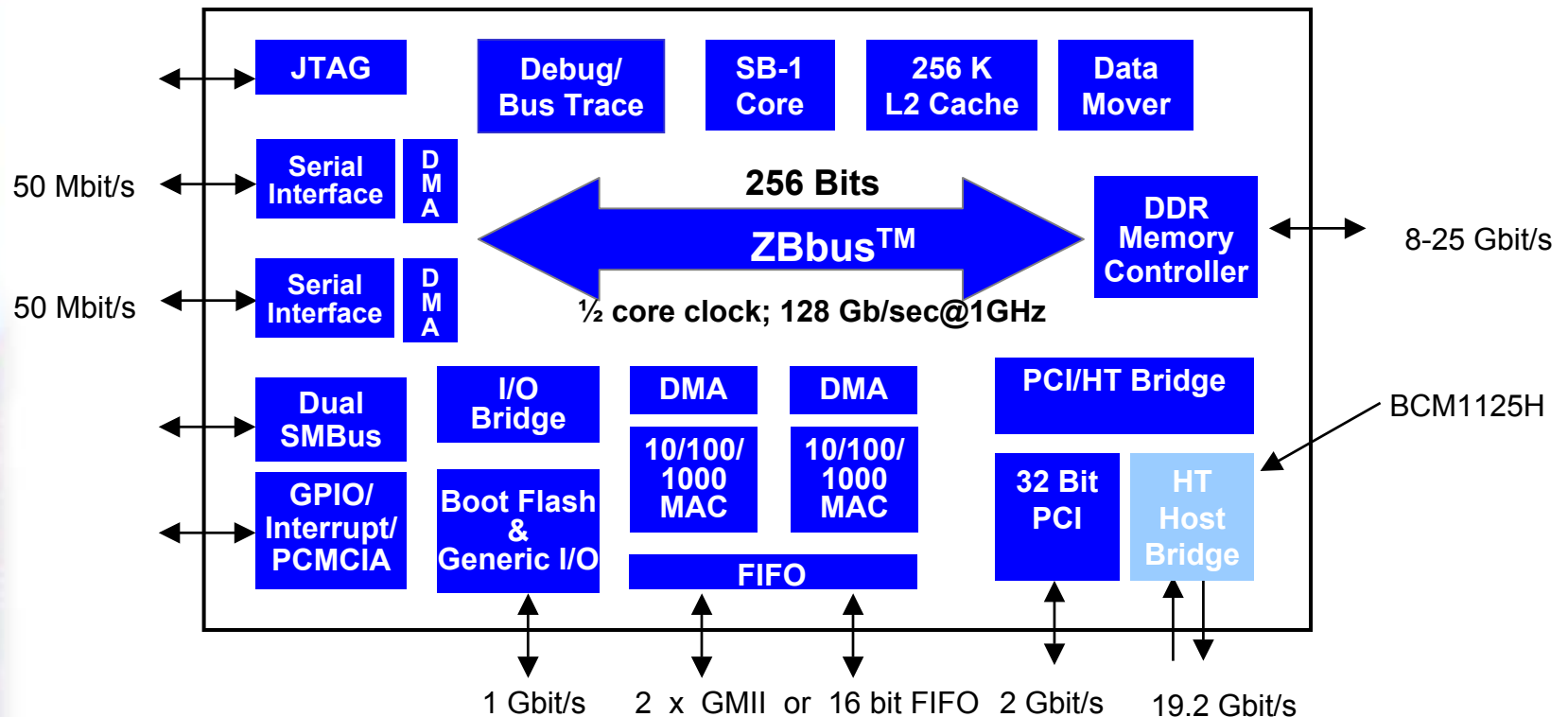
### □ HyperTransport I/O Interface

- ◆ 8 bits wide @ 600 MHz DDR gives 9.6 Gbit/s each direction

# BCM1125/H

- ❑ Single Processor, MIPS SOC @ 400MHz-1GHz
- ❑ Fast On Chip, Fully Coherent Bus
- ❑ 256 KB L2 Cache, ECC Protected
- ❑ Integrated DDR Memory Controller
- ❑ Integrated IO
  - ◆ 2 GMII, 32bit/66MHz PCI, HyperTransport (1125H), SMBus, GPIO, Flash interface, Interrupts, Timers, DMA, PCMCIA

# BCM1125/H Block Diagram



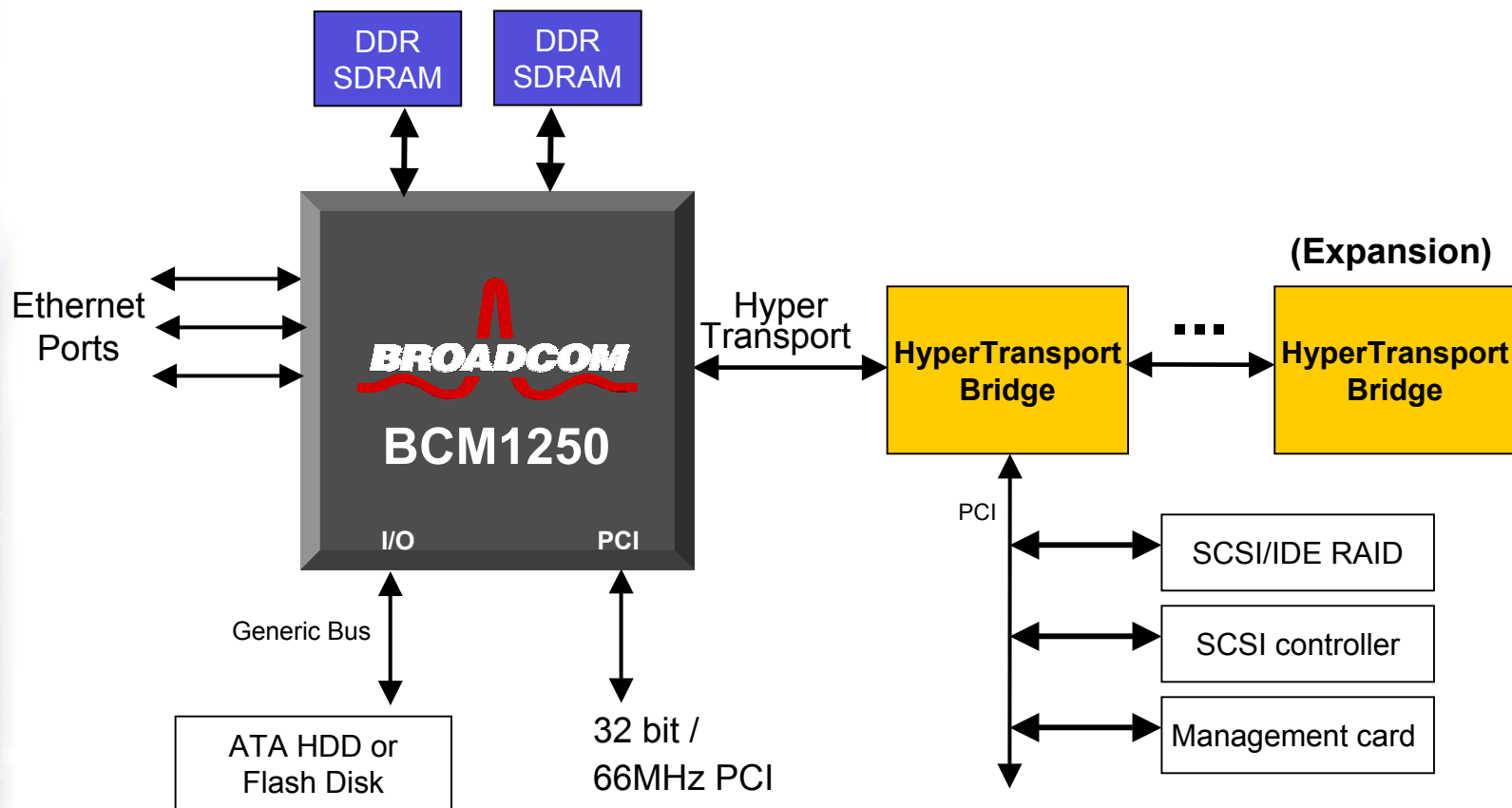
## ❑ HyperTransport I/O Interface

- ◆ 8 bits wide @ 600 MHz DDR gives 9.6 Gbit/s each direction

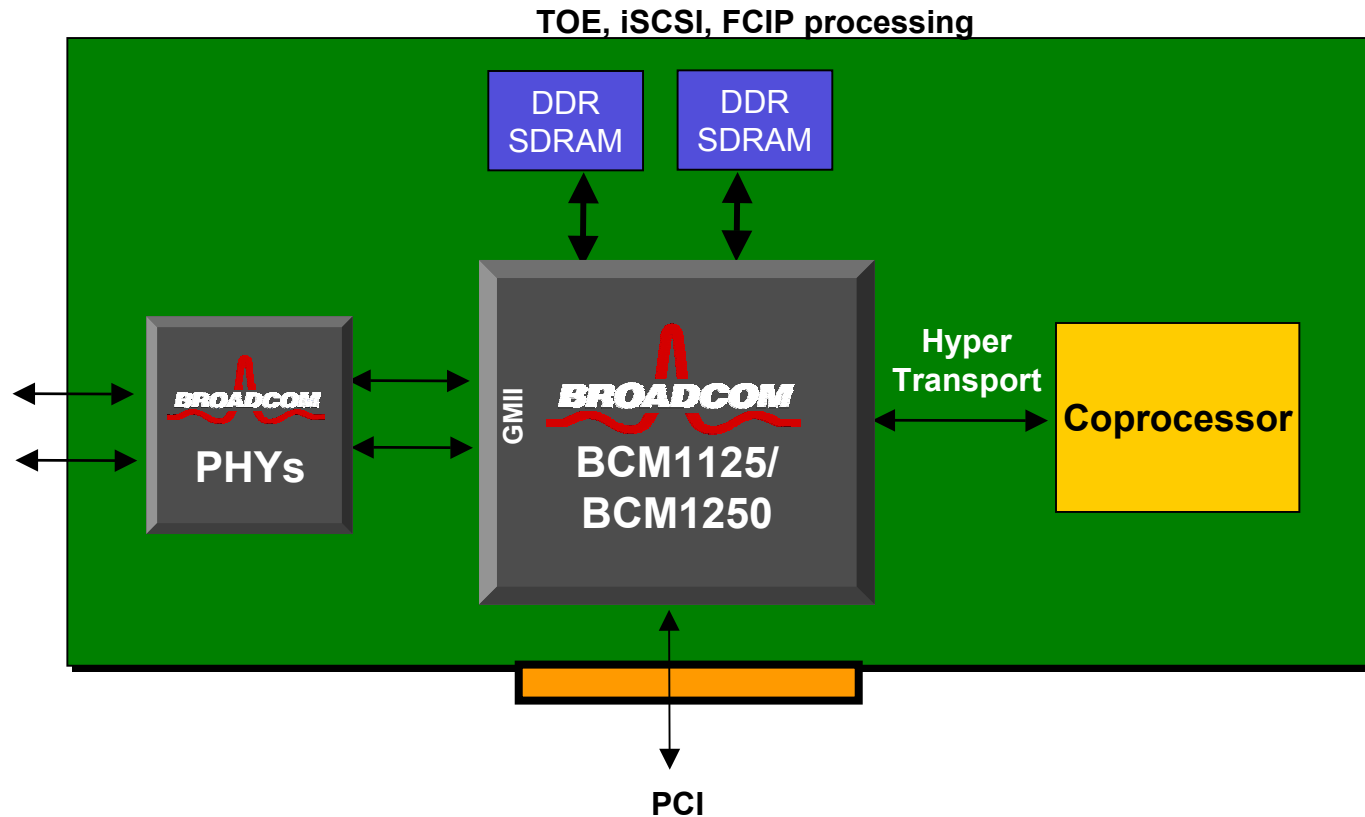
# Application Examples

- ❑ Computing Platforms
  - ◆ Blade Servers
  - ◆ Intelligent I/O Card
- ❑ Networking Platforms
  - ◆ Control Plane
  - ◆ Service Processing

# BCM1250 in Blade Servers (General Purpose or Appliances)

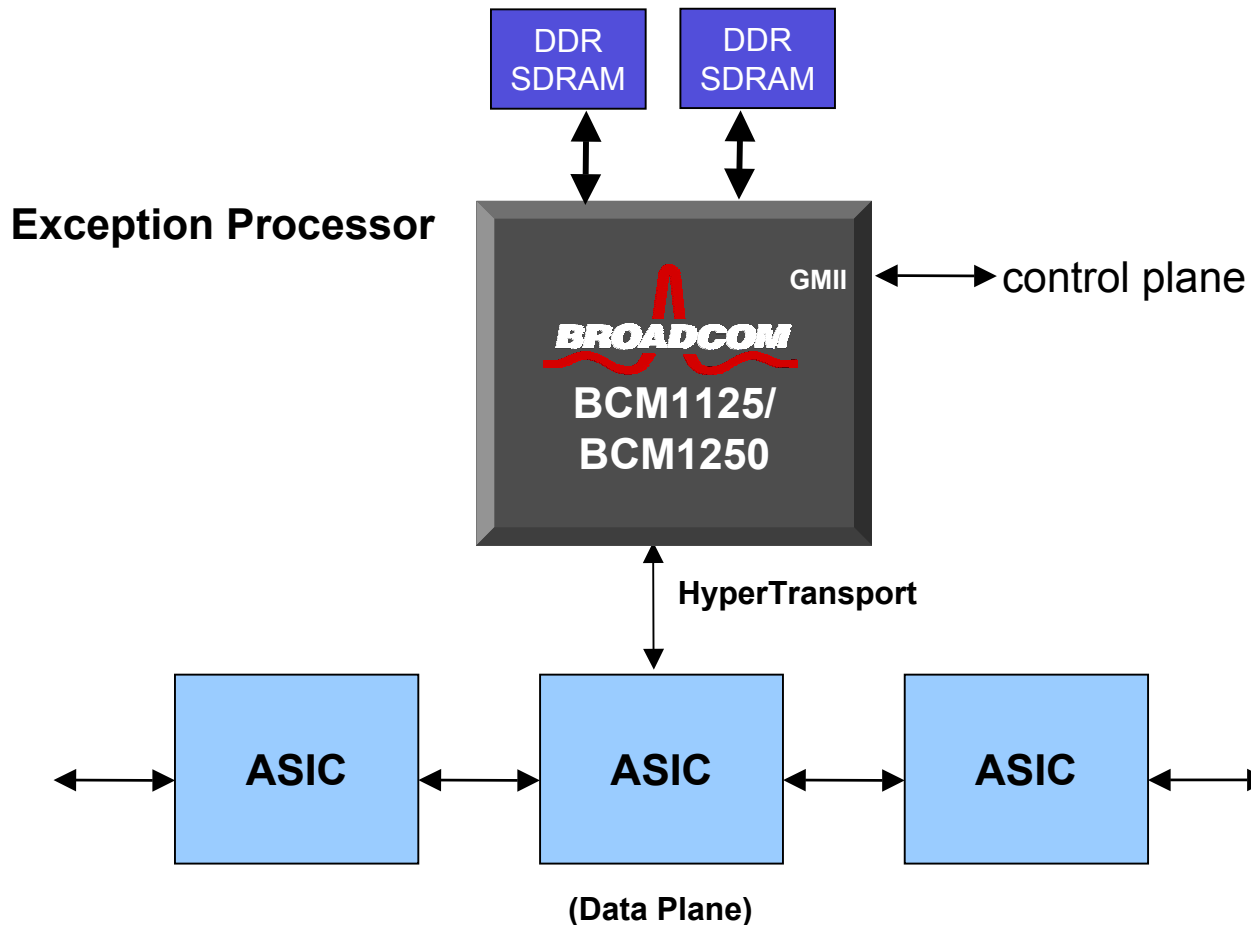


# BCM1250/1125H PCI Card

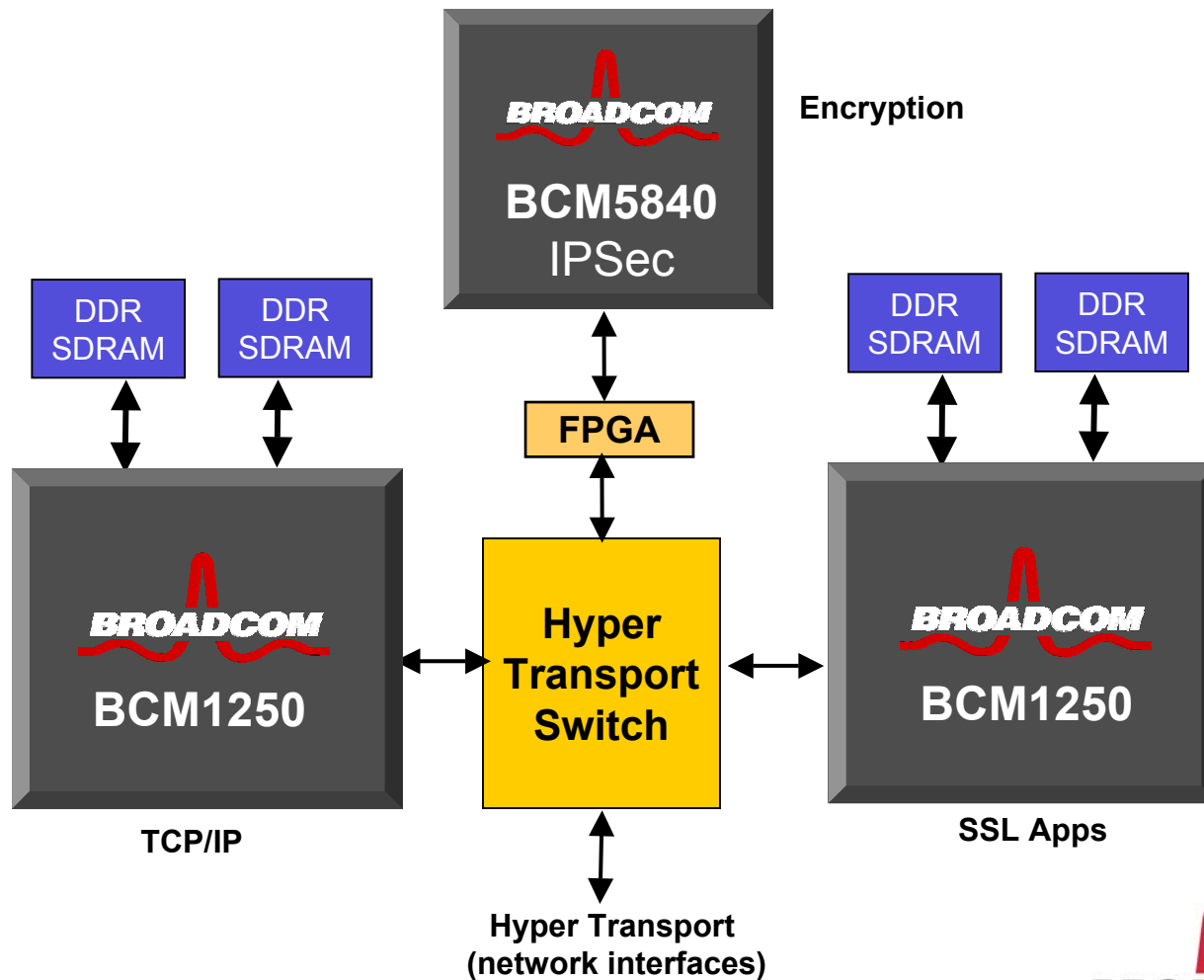




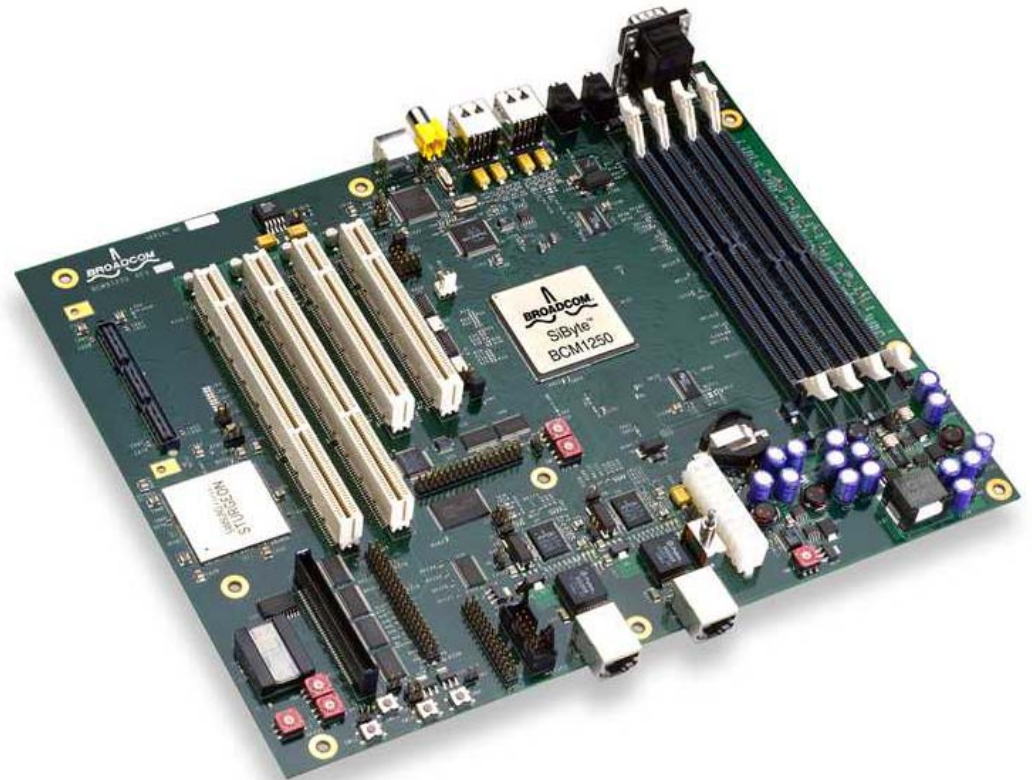
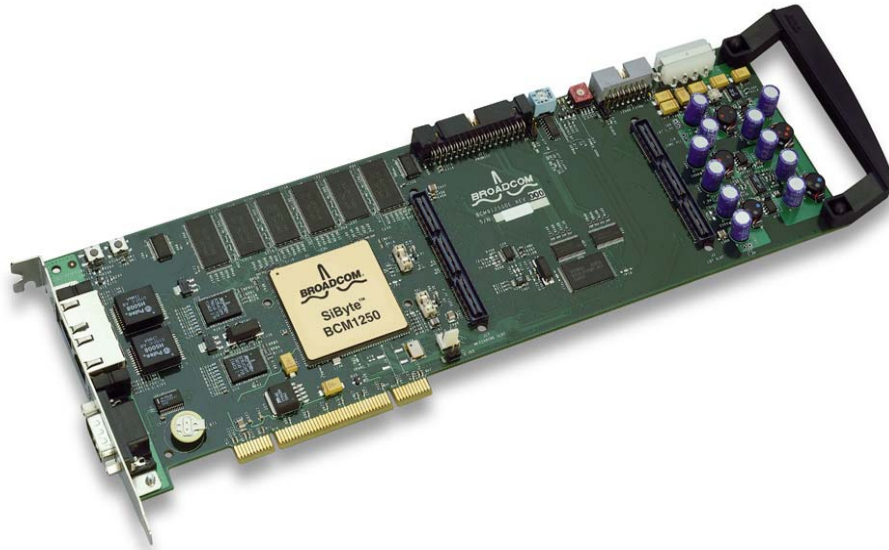
# BCM1125/1250 in Networking Control Plane Applications



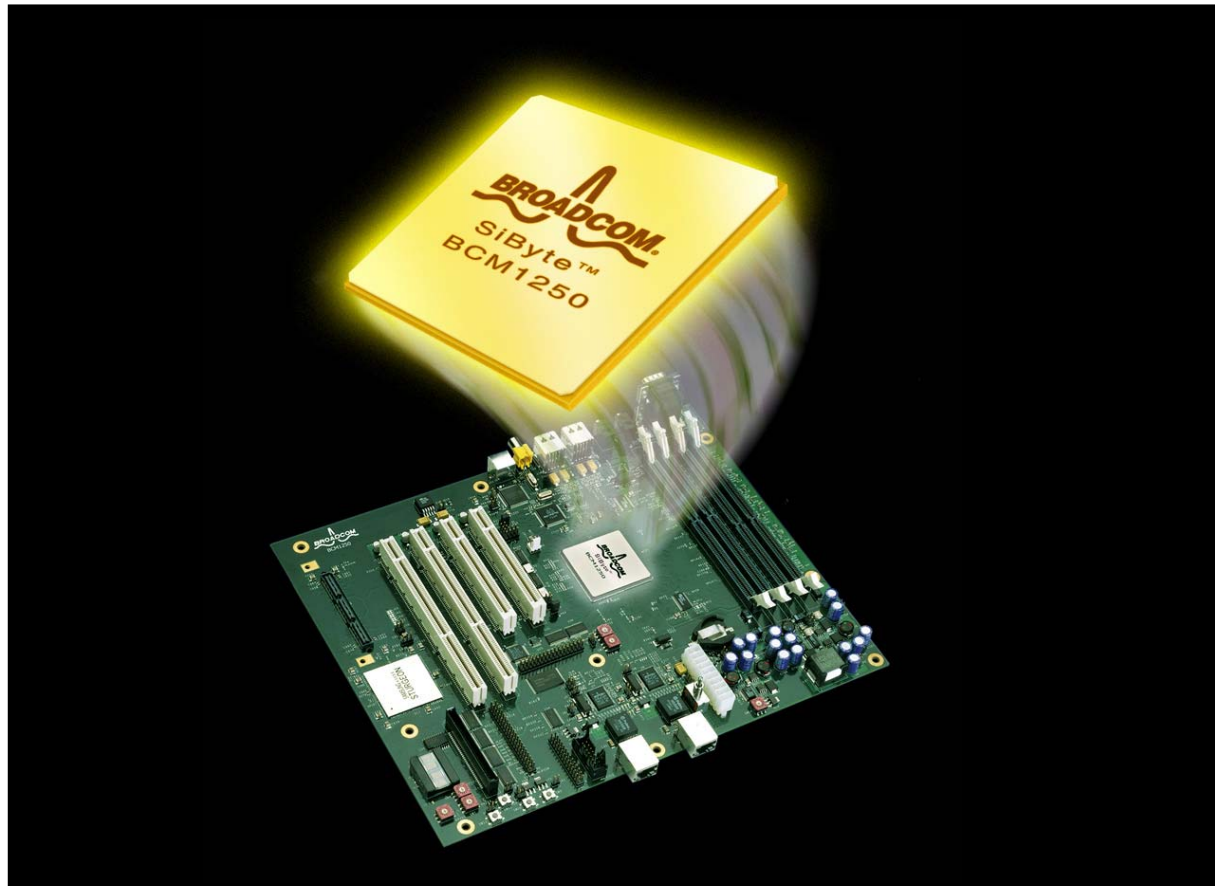
# BCM1250 in a Switched Networking Application



# Evaluation Boards



# Broadcom is the first to deliver a processor with HyperTransport!



# Broadcom Demonstrations

- Double-Hosted HyperTransport
  - ◆ Two BCM1250, acting as separate hosts, communicating via HyperTransport
- Using the HyperTransport-PCI Bridge
  - ◆ Two BCM1250s communicating through the HyperTransport-PCI Bridge